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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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30449	7590	02/13/2006	EXAMINER	
SCHMEISER, OLSEN + WATTS			VO, TED T	
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SUITE 201			PAPER NUMBER	
LATHAM, NY 12110			2191	

DATE MAILED: 02/13/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	09/728,096	BERA, RAJENDRA KUMAR	
	Examiner	Art Unit	
	Ted T. Vo	2191	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 15 December 2004.
- 2a) ☐ This action is FINAL. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-19 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-19 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☒ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 01 December 2000 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|---|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____ |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

1. This action is in response to the amendment filed on 12/15/2004 entered by petition decision dated on 11/17/05.

Claims 8-19 are newly added.

Claims 1-19 are pending in the application.

Response to Arguments

2. Applicant's arguments in the remarks filed on 12/15/2004 have been fully considered. This action is non-final because of new ground of rejections. The arguments are moot.

Specification

3. The abstract of this disclosure is objected to. The abstract should be in narrative form and generally limited to a single paragraph on a separate sheet within the range of 50 to 150 words. The form and legal phraseology often used in patent claims should be avoided. The abstract should describe the disclosure sufficiently to assist readers in deciding whether there is a need for consulting the full patent text for details. See MPEP § 608.01(b)

4. The arrangement of the specification of this disclosure is objected to.

The following guidelines illustrate the preferred layout for the specification of a utility application. These guidelines are suggested for the applicant's use.

Arrangement of the Specification

As provided in 37 CFR 1.77(b), the specification of a utility application should include the following sections in order. Each of the lettered items should appear in upper case, without underlining or

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bold type, as a section heading. If no text follows the section heading, the phrase "Not Applicable" should follow the section heading:

- (a) TITLE OF THE INVENTION.
- (b) CROSS-REFERENCE TO RELATED APPLICATIONS.
- (c) STATEMENT REGARDING FEDERALLY SPONSORED RESEARCH OR DEVELOPMENT.
- (d) THE NAMES OF THE PARTIES TO A JOINT RESEARCH AGREEMENT
- (e) INCORPORATION-BY-REFERENCE OF MATERIAL SUBMITTED ON A COMPACT DISC
(See 37 CFR 1.52(e)(5) and MPEP 608.05. Computer program listings (37 CFR 1.96(c)), "Sequence Listings" (37 CFR 1.821(c)), and tables having more than 50 pages of text are permitted to be submitted on compact discs.) or
REFERENCE TO A "MICROFICHE APPENDIX" (See MPEP § 608.05(a). "Microfiche Appendices" were accepted by the Office until March 1, 2001.)
- (f) BACKGROUND OF THE INVENTION.
 - (1) Field of the Invention.
 - (2) Description of Related Art including information disclosed under 37 CFR 1.97 and 1.98.
- (g) BRIEF SUMMARY OF THE INVENTION.
- (h) BRIEF DESCRIPTION OF THE SEVERAL VIEWS OF THE DRAWING(S).
- (i) DETAILED DESCRIPTION OF THE INVENTION.
- (j) CLAIM OR CLAIMS (commencing on a separate sheet).
- (k) ABSTRACT OF THE DISCLOSURE (commencing on a separate sheet).
- (l) SEQUENCE LISTING (See MPEP § 2424 and 37 CFR 1.821-1.825. A "Sequence Listing" is required on paper if the application discloses a nucleotide or amino acid sequence as defined in 37 CFR 1.821(a) and if the required "Sequence Listing" is not submitted as an electronic document on compact disc).

Double Patenting

5. The nonstatutory double patenting rejection is based on a judicially created doctrine grounded in public policy (a policy reflected in the statute) so as to prevent the unjustified or improper timewise extension of the "right to exclude" granted by a patent and to prevent possible harassment by multiple assignees. See *In re Goodman*, 11 F.3d 1046, 29 USPQ2d 2010 (Fed. Cir. 1993); *In re Longi*, 759 F.2d 887, 225 USPQ 645 (Fed. Cir. 1985); *In re Van Ornum*, 686 F.2d 937, 214 USPQ 761 (CCPA 1982); *In re Vogel*, 422 F.2d 438, 164 USPQ 619 (CCPA 1970); and, *In re Thorington*, 418 F.2d 528, 163 USPQ 644 (CCPA 1969).

A timely filed terminal disclaimer in compliance with 37 CFR 1.321(c) may be used to overcome an actual or provisional rejection based on a nonstatutory double patenting ground provided the conflicting application or patent is shown to be commonly owned with this application. See 37 CFR 1.130(b).

Effective January 1, 1994, a registered attorney or agent of record may sign a terminal disclaimer. A terminal disclaimer signed by the assignee must fully comply with 37 CFR 3.73(b).

6. Claims 1, 6 and 7 are rejected under the judicially created doctrine of obviousness-type double patenting as being respectively unpatentable over claim 15 of U. S. Patent Application Publication No. 20060015550 A1. Although the conflicting claims are not identical, they are not patentably distinct from each other because: Claims 1, 6 and 7 recite the steps/means (a), (b) (c) characterized for comparing to

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algebraic expressions; these steps/means are broadly enough to cover the simulation of a first set of algebraic equations and second set of algebraic equation limitations included with (a1) → (a7), and (b) 'comparing..' as in Claim 15 of U. S. Patent Application Publication No. 20060015550 A1.

7. Claims 1, 6 and 7 are rejected under the judicially created doctrine of obviousness-type double patenting as being respectively unpatentable over claim 1 of U. S. Patent No. 6,578,196 B1. Although the conflicting claims are not identical, they are not patentably distinct from each other because: Claims 1, 6 and 7 recite the steps/means (a), (b) (c) characterized for comparing to algebraic expressions; these steps/means are broadly enough to cover the checking method that include expressions recited with steps recasting, reducing, and checking said reduced strings as in Claim 1 of U. S. Patent No. 6,578,196 B1.

Claim Rejections - 35 USC § 101

8. 35 U.S.C. 101 reads as follows:

Whoever invents or discovers any new and useful process, machine, manufacture, or composition of matter, or any new and useful improvement thereof, may obtain a patent therefor, subject to the conditions and requirements of this title.

9. The claims 1-19 are rejected under 35 U.S.C 101 because the claimed invention is directed to non-statutory subject matter.

A claim is statutory if it meets practical, concrete, and tangible result.

Fact 1: See MPEP

(b) Statutory Process Claims

A claim that requires one or more acts to be performed defines a process. However, not all processes are statutory under 35 U.S.C. 101. Schrader, 22 F.3d at 296, 30 USPQ2d at 1460. To be statutory, a claimed computer-related process must either: (A) result in a physical transformation outside the computer for which a practical application in the technological arts is either disclosed in the specification or would have been known to a skilled artisan (discussed in i) below), or (B) be limited to a practical application within the technological arts (discussed in ii) below). See Diamond v. Diehr, 450 U.S. at 183-

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84, 209 USPQ at 6 (quoting *Cochrane v. Deener*, 94 U.S. 780, 787-88 (1877)) ("A [statutory] process is a mode of treatment of certain materials to produce a given result. It is an act, or a series of acts, performed upon the subject-matter to be transformed and reduced to a different state or thing.... The process requires that certain things should be done with certain substances, and in a certain order; but the tools to be used in doing this may be of secondary consequence."). See also *Alappat*, 33 F.3d at 1543, 31 USPQ2d at 1556-57 (quoting *Diamond v. Diehr*, 450 U.S. at 192, 209 USPQ at 10). See also *id.* at 1569, 31 USPQ2d at 1578-79 (Newman, J., concurring) ("unpatentability of the principle does not defeat patentability of its practical applications") (citing *O'Reilly v. Morse*, 56 U.S. (15 How.) at 114-19). If a physical transformation occurs outside the computer, a disclosure that permits a skilled artisan to practice the claimed invention, i.e., to put it to a practical use, is sufficient. On the other hand, it is necessary for the claimed invention taken as a whole to produce a practical application if there is only a transformation of signals or data inside a computer or if a process merely manipulates concepts or converts one set of numbers into another.

A claimed process is clearly statutory if it results in a physical transformation outside the computer, i.e., falls into one or both of the following specific categories ("safe harbors").

Fact 2: See MPEP

A process that merely manipulates an abstract idea or performs a purely mathematical algorithm is nonstatutory despite the fact that it might inherently have some usefulness. In *Sarkar*, 588 F.2d at 1335, 200 USPQ at 139, the court explained why this approach must be followed:

No mathematical equation can be used, as a practical matter, without establishing and substituting values for the variables expressed therein. Substitution of values dictated by the formula has thus been viewed as a form of mathematical step. If the steps of gathering and substituting values were alone sufficient, every mathematical equation, formula, or algorithm having any practical use would be per se subject to patenting as a "process" under 101. Consideration of whether the substitution of specific values is enough to convert the disembodied ideas present in the formula into an embodiment of those ideas, or into an application of the formula, is foreclosed by the current state of the law.

For such subject matter to be statutory, the claimed process must be limited to a practical application of the abstract idea or mathematical algorithm in the technological arts. See *Alappat*, 33 F.3d at 1543, 31 USPQ2d at 1556-57 (quoting *Diamond v. Diehr*, 450 U.S. at 192, 209 USPQ at 10). See also *Alappat* 33 F.3d at 1569, 31 USPQ2d at 1578-79 (Newman, J., concurring) ("unpatentability of the principle does not defeat patentability of its practical applications") (citing *O'Reilly v. Morse*, 56 U.S. (15 How.) at 114-19). A claim is limited to a practical application when the method, as claimed, produces a concrete, tangible and useful result; i.e., the method recites a step or act of producing something that is concrete, tangible and useful. See *AT & T*, 172 F.3d at 1358, 50 USPQ2d at 1452. Likewise, a machine claim is statutory when the machine, as claimed, produces a concrete, tangible and useful result (as in *State Street*, 149 F.3d at 1373, 47 USPQ2d at 1601) and/or when a specific machine is being claimed (as in *Alappat*, 33 F.3d at 1544, 31 USPQ2d at 1557 (*en banc)). For example, a computer process that simply calculates a mathematical algorithm that models noise is nonstatutory. However, a claimed process for digitally filtering noise employing the mathematical algorithm is statutory.

Examples of this type of claimed statutory process include the following:

- A computerized method of optimally controlling transfer, storage and retrieval of data between cache and hard disk storage devices such that the most frequently used data is readily available.
- A method of controlling parallel processors to accomplish multi-tasking of several

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computing tasks to maximize computing efficiency. See, e.g., In re Bernhart, 417 F.2d 1395, 1400, 163 USPQ 611,616 (CCPA 1969).

– A method of making a word processor by storing an executable word processing application program in a general purpose digital computer's memory, and executing the stored program to impart word processing functionality to the general purpose digital computer by changing the state of the computer's arithmetic logic unit when program instructions of the word processing program are executed.

– A digital filtering process for removing noise from a digital signal comprising the steps of calculating a mathematical algorithm to produce a correction signal and subtracting the correction signal from the digital signal to remove the noise.

As per claims 1-5, 8-9:

Regarding term, "in a computer environment", it should be noted that thing such as a computer desk is also a computer environment.

In Claim 1, as it defines in the preamble, "A method of determining, in a computer environment, the equivalence, if any, of two **algebraic expressions**", this method is followed by steps (a), (b), and (c), where (a), (b), and (c) are solely a manipulation of the two **algebraic expressions**. The three steps, at first fail to be a tangible process, thus cannot produce a practical, concrete, and tangible result. The three steps are merely manipulating and arranging the variables and the arithmetic symbols within the algebraic expressions such as described in the specification. For example, to support for this claimed method, the specification describes the performance of the method as $a-(x-b)$ becomes $a*x-a*b$; a^n becomes $a-a*...a$, etc. Take $a-(x-b)$ as an example: With the step (a), "recasting" shows a different arrangement of $a-(x-b)$, i.e. it becomes $a*x-a*b$. With the step (b), "reducing", it means the form $a*x-a*b$ would be simplified or not. In this case, there no such a simplification because $a*x-a*b$ is already reduced. With the step (c), "comparing", it means if $a*x-a*b$ is reduced then the new form must be the same or equivalence in value with $a-(x-b)$.

Thus, we see that this claim is the manipulation of a mathematical expression and it preempts the common rules of algebra which can be seen and done in basic math. In this case, the claim is not quite different from example in MPEP for the nonstatutory case, the calculation of a mathematical algorithm that models noise.

Such claiming is the preemption of a rule of nature in math and known to any skills of the art. Nothing is new and thus it will not produce any practical applications.

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The analysis shows there are no categories to classify the claim to any statutory one as given in the examples in the EMPEP.

The Claim is merely the manipulation of a mathematical formula/expression/principle. Thus, the Claim is nonstatutory because it preempts the rules of nature of math and it presents a mere abstract idea.

Claims 2-5, 8-9 merely recite the algebraic rules, fail to remedy the deficiency of Claim 1.

Claims 1-5, 8-9 are nonstatutory under 35 U.S.C 101.

As per claims 6, 10-14, and 7, 15-19:

Claims are rejected under nonstatutory in the same rationale as addressed above, where Claims 6, 10-14 are claiming a program per se, where Claims 7, 15-19

Claim Rejections - 35 USC § 103

10. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

11. Claims 1-19 are rejected under 35 U.S.C. 103(a) as being unpatentable over the rules of Algebra. Given the broadest reasonable interpretation of followed claims in light of the specification.

As per Claim 1:

Official notice is taken that the Algebraic rules discloses the Claimed limitations:

The algebraic rules disclose,

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A method of determining, in a computer environment, the equivalence, if any, of two algebraic expressions for use in compiler optimisation of source code and like computing tasks, said method comprising the steps of:

Algebra rules show (a): For example, take $(a+b)(a-b)$, one expression and a^2-b^2 , another expression, they are equivalent and will be recasting into a form $a*a -a*b+a*b-b*b$, by using the known rules of algebra.

(a) recasting said expressions into a form of one or more token pairs arranged sequentially in a string, each said token pair comprising an operator followed by an operand;

Algebra rules show (b): For example $a*a -a*b+a*b-b*b$ is reduced by algebraic rules as $a*a-b*b$.

(b) reducing said strings in accordance with a set of predetermined simplifying rules; and

Algebra rules show (c): For example $(a+b)(a-b) = a*a-b*b$; and a^2-b^2 is another expression of $a*a-b*b$. In fact $(a+b)(a-b)$ equals to a^2-b^2 , equals to $a*a -a*b+a*b-b*b$.

(c) comparing the reduced strings by matching, to detect equivalence of the two algebraic expressions.

Therefore, it would be obvious to an ordinary in the art to apply rules/notation of algebra to implement the claim.

As per Claim 2: Algebraic rules disclose,

The method of claim 1,

whereby the recasting step (a) is preceded by a preconditioning step comprising, in relation to said algebraic expressions, the following sub-steps according to whether a sub step applies: (da) deleting a space in the expression; (db) removing a bracket in the expression by expanding a bracketed sub-expressions; (dc) inserting a unitary operator at the start of the expression; (dd) recasting a power factor, being a variable being raised to a power in the expression, in an alternate form as one of: (dda) the power factor being expressed as the variable multiplied by itself as many times as the power, if the power is a positive integer; (ddb) the power factor being expressed as a reciprocal of the variable multiplied by itself as many times as an absolute value of the power, if the power is a negative integer; (ddc) the power factor being replaced by an appropriate function which can compute the power factor, if the power is not an integer; (de) recasting a constant in the expression in exponential format; (df) substituting a "+" operator in the expression by "+1", a "1" being in exponential format, (dg) substituting a "-" operator in*

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*the expression by "-1**", a "1" being in exponential format; and (dh) recasting a "division by a constant" in the expression as multiplication by a reciprocal of the constant.*

The example of $(a+b)(a-b)$ and a^2-b^2 recasting into a form $a*a -a*b+a*b-b*b$, meet claim 2 because the claim 2 preempts the rules of algebra.

For example, algebraic rules:

(da): "a+ b" or "a+b" are the same (space deleting);

(db): (a+b) and a+b are the same (bracket removing);

(dc): a and +a are the same (inserting);

(dd): a^2 or $a*a$ are the same (power recasting), and the same as to sub (dda), (ddb), (ddc);

(de): 12 and $.12*10^2$ are the same;

Further addressed to (df), (dg) , and (dh); these limitations are also applied to algebraic rules.

As per Claim 3: Algebraic rules disclose Claim 3 because Claim 1 recites all rules of algebra (See rationale addressed in Claim 2), where Claim 3 recites as,

The method of claim 1, whereby the simplifying rules in step (b) comprise: (ba) arranging token pairs into subgroups; (bb) arranging operand tokens in an arranged subgroup in order; (bc) reducing the ordered operands by consolidating one or more constants and eliminating variables of opposite effect to form reduced subgroups; and (bd) consolidating one or more multiple instances of similar subgroups, to produce a reduced string.

As per Claim 4: Algebraic rules disclose Claim 4 because Claim 4 recites all rules of algebra (See rationale addressed in Claim 2), where Claim 4 recites as, *The method of claim 1, whereby an algebraic expression whose equivalence is to be determined contains an aliased variable, said method comprising an additional sub-step of arranging an ordered list of aliases of the variable, and substituting a first alias in the ordered list for all instances of the aliased variable in the expression.*

As per Claim 5: Algebraic rules disclose Claim 5 because Claim 5 recites all rules of algebra (See rationale addressed in Claim 2), where Claim 5 recites as, *The method according to claim 1, whereby an algebraic expression whose equivalence is to be determined contains a function, said method comprising*

additional sub-steps of: reducing function arguments using the set of predetermined simplifying rules; and replacing the function by a tagged string, said string designating a function name, parameter types, and arguments, whereby the tag distinguishes the function name from a variable.

As per Claim 8: Algebraic rules disclose Claim 8 because Claim 8 recites all rules of algebra (See rationale addressed in Claim 2).

As per Claim 9: Claim recites an intended use of the preamble, because the Claim 9 does not related to the scope of determining. Official notice is taken that compiling is common method for converting a programming source code into an object code (Refer to a well-known book "Compilers, Principles, Technique, and Tools"; Authors: Aho et al.). It is obvious to ordinary in the art to use and to include for taking advantage of well-known compilation rules.

As per Claim 6: Algebraic rules disclose Claim 6 because Claim 6 recites all rules of algebra (See rationale addressed in Claim 1), where Claim 6 recites as, *An apparatus adapted to determine, in a computer environment, the equivalence, if any, of two algebraic expressions for use in compiler optimisation of source code and like computing tasks, said apparatus comprising: (a) recasting means for recasting said expressions into a form of one or more token pairs arranged sequentially in a string, each said token pair comprising an operator followed by an operand; (b) reduction means for reducing said strings in accordance with a set of predetermined simplifying rules; and (c) comparison means for comparing the reduced strings by matching, to detect equivalence of the two algebraic expressions.*

As per Claims 10-14: As further limitations from Claim 6, Algebraic rules disclose claims 10-14. See rationale addressed in Claim 2, and 9 respectively.

As per Claim 7: Algebraic rules disclose Claim 7 because Claim 7 recites all rules of algebra (See rationale addressed in Claim 2), where Claim 7 recites as,

A computer program product including a computer readable medium having recorded thereon a computer program for determining, in a computer environment, the equivalence, if any, of two algebraic expressions for use in compiler optimisation of source code and like computing tasks, said program comprising: (a) recasting process steps for recasting said expressions into a form of one or more token pairs arranged sequentially in a string, each said token pair comprising an operator followed by an operand; (b) reduction

process steps for reducing said strings in accordance with a set of predetermined simplifying rules; and
(c) comparison process steps for comparing the reduced strings by matching, to detect equivalence of the
two algebraic expressions.

As per Claims 15-19: As further limitations from Claim 7, Algebraic rules disclose claims 15-19. See rationale addressed in Claim 2, and 9 respectively.

Conclusion

12. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Ted T. Vo whose telephone number is (571) 272-3706. The examiner can normally be reached on 8:00AM to 5:30PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Wei Y. Zhen can be reached on (571) 272-3708.

The facsimile number for the organization where this application or proceeding is assigned is the Central Facsimile number **571-273-8300**.

Any inquiry of a general nature or relating to the status of this application should be directed to the TC 2100 Group receptionist: 571-272-2100. Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).



Ted T. Vo
Primary Examiner
Art Unit 2191
February 3, 2006